



## TOSCA Postdoctoral position on AstroStatistics

*2 years postdoctoral research position*

**Keywords:** Cosmology – Statistics – *Uncertainties - Inverse Problems – Euclid & SKA*

ENSICAEN and CEA Saclay astrophysics department (Dap) invite applications for a postdoctoral position in astrostatistics. The successful candidate will work with Dr. Jalal Fadili (Caen) and Dr. Jean-Luc Starck (CEA) within the ANR funded project TOSCA on weak lensing statistics for cosmology, which investigates synergies between optical and radio surveys, with partners in CEA Saclay, Nice, Caen and Geneva. The successful candidate will be based at Caen with regular visits to Saclay, and will collaborate very closely with all TOSCA members, at CEA, Nice, Caen and Geneva.

**Context** Weak gravitational lensing is a powerful probe to study the Universe and will be used in the coming years by both the Euclid and SKA surveys. Forecasts have shown that Euclid-SKA synergy will allow us to control systematics with an accuracy impossible to achieve using only one single survey. The objective of **TOSCA** is threefold: i) develop new radio weak lensing tools for deep learning image reconstruction and galaxy shape measurements; ii) develop efficient deep learning mass mapping methods for both Euclid and SKA including an estimation of the uncertainties, and iii) develop statistical tools to jointly estimate cosmological parameters from both surveys.

**The postdoc** This postdoctoral position will contribute to reconstruct mass map from radio shear measurements using deep learning techniques, investigate the robustness and generalization problems, develop a new uncertainty quantification framework which includes theoretically guaranteed coverage properties, relying on conformal quantile regression, and extend the methodology to spherical data. The postdoc will join the Euclid and SKA consortia.

The candidate should hold a PhD in one or several of the following areas: electrical engineering/statistics/applied mathematics/physics/astrophysics. The position includes an internationally competitive salary and generous travel budget. French

language skills are not required. Applicants should send a CV, a research statement and a cover letter to Jalal Fadili ([Jalal.Fadili@greyc.ensicaen.fr](mailto:Jalal.Fadili@greyc.ensicaen.fr)) and Jean-Luc Starck ([jstarck@cea.fr](mailto:jstarck@cea.fr)), and arrange for three reference letters to be sent to the above e-mail addresses before the application deadline.

ENSICAEN is located in the heart of a large campus in the North of the city of Caen, Normandy region, in the vicinity of various universities and colleges but also very large research facilities. Caen is extremely well connected including to Paris by train for less than two hours. The GREYC laboratory is the largest laboratory in computer science and engineering in Normandy. The group where the postdoc will be hosted is a diverse team that gathers experts expertise in signal/image processing, machine learning, inverse problems, statistics and optimization. It has a strong and long-standing collaboration with the CosmoStat group at CEA Saclay.

CEA Saclay is located 20 km south of Paris, France, in the vicinity of various universities and other research centres. The Paris region contains numerous research institutes. The CosmoStat group is a diverse and multi-disciplinary team of researchers working on various topics in cosmology. The successful candidate will join the CosmoStat team that gathers experts in astrophysics, signal processing and data science to work on challenging problems in cosmology such as weak gravitational lensing, modified gravity, radio interferometry, blind source separation, and machine learning.

Our groups are committed to diversity and equality, and encourage applications from women and underrepresented minorities. We support a flexible and family-friendly work environment. Benefits for this position include retirement, health care, parental leave, vacation and sick days, subsidized meals, discount for public transport, sport and culture, French language classes.

- **Contacts:** Jalal Fadili ([Jalal.Fadili@greyc.ensicaen.fr](mailto:Jalal.Fadili@greyc.ensicaen.fr)), Jean-Luc Starck([jstarck@cea.fr](mailto:jstarck@cea.fr))
- Deadline for applications: 31st May 2023
- Start date: Before October 2024 (flexible)
- Contract duration: 2 years